

CLAIMS:

1. A head protection system comprising a helmet shell,

mounting means on the shell for pivotally mounting  
5 a visor thereto to permit the visor to be moved between  
raised and lowered positions,

retaining means for releasably retaining a visor  
on the mounting means, and

10 a visor being adapted for mounting on said  
mounting means and comprising a construction such that at  
least a portion of the visor has a V-50 impact rating of  
600 metres per second or more using the test standard  
MIL-STD-662F using a 0.22mm projectile defined in  
MIL-P-46593A.

15 2. A head protection system comprising a helmet  
shell,

mounting means on the shell for pivotally mounting  
a visor thereto to enable the visor to be moved between  
raised and lowered positions,

20 retaining means for releasably retaining a visor  
on the mounting means, and

a visor adapted for mounting on said mounting  
means and comprising a layer of transparent material, and a  
plurality of layers of ballistic resistant material.

25 3. A head protection system as claimed in claim 1,  
wherein the visor comprises a layer of transparent material  
and a plurality of layers of ballistic resistant material.

4. A head protection system as claimed in claim 2 or  
3, wherein said visor further comprises a second layer of

transparent material adjacent the first layer of transparent material.

5. A head protection system as claimed in claim 4, wherein said second layer of transparent material comprises a thermoplastic material such as polycarbonate or acrylic, or the second layer comprises glass.

6. A head protection system as claimed in any one of claims 2 to 5, wherein said first layer of transparent material comprises a thermoplastic material, such as acrylic or polycarbonate, or said first layer comprises glass.

7. A head protection system as claimed in any one of claims 4 or 5, wherein said visor has a front and a back, and said second layer is positioned towards the front of the visor, the first layer is positioned behind the second layer and the plurality of layers of ballistic resistant material are positioned behind the first layer.

8. A head protection system as claimed in claim 7, wherein said second layer comprises acrylic and said first layer comprises polycarbonate.

20 9. A head protection system as claimed in any one of claims 2 to 6, wherein said visor has a front and a rear, and said first layer is positioned towards the front of said visor and the plurality of layers of ballistic resistant material are positioned towards the rear of said visor.

25 10. A head protection system as claimed in claim 9, wherein said first layer comprises one of polycarbonate and acrylic.

11. A head protection system as claimed in claim 2 or 3, wherein said plurality of layers of ballistic resistant material define an opening for permitting light to pass

through said visor, and a second layer of transparent material, such as acrylic or polycarbonate is positioned in front of and adjacent said first layer and which extends over said transparent opening.

5 12. A head protection system as claimed in claim 11, wherein the first layer extends beyond the second layer.

13. A head protection system as claimed in claim 12, wherein said first layer extends to form front and side portions of said visor.

10 14. A head protection system as claimed in any preceding claim, further comprising a second visor adapted for mounting on said mounting means and to be releasably retained by said retaining means.

15 15. A head protection system as claimed in claim 14, wherein said second visor is shaped for accommodating a face mounted respirator when said helmet is worn by a user and the visor is in the lowered position.

20 16. A head protection system as claimed in claim 14 or 15, wherein said second visor comprises a layer of transparent material and a plurality of layers of ballistic resistant material.

25 17. A head protection system as claimed in claim 16, wherein said second visor further comprises a second layer of transparent plastic material positioned in front of and adjacent to said first layer of transparent material.

18. A head protection system as claimed in claim 17, wherein said first layer of transparent material comprises one of acrylic and polycarbonate, and said second layer comprises one of acrylic and polycarbonate.

19. A head protection system as claimed in any preceding claim, further comprising locking means for releasably locking said visor in at least one of a raised position and a lowered position.

5 20. A head protection system as claimed in claim 19, wherein said locking means comprises a depressible locking member mounted on said helmet shell for engaging a portion of said visor to lock said visor in a raised or lowered position.

10 21. A head protection system as claimed in claim 20, wherein said locking system further comprises a manually accessible depressible member coupled to said locking member.

22. A head protection system as claimed in claim 21, 15 wherein said visor includes at least one slot or aperture for receiving said locking member to lock said visor in the raised and/or lowered position.

23. A head protection system as claimed in any preceding claim, further comprising means for retaining said 20 retaining means on said helmet shell when said visor is released from said shell.

24. A head protection system as claimed in any preceding claim, wherein said helmet shell is the open-face type.

25 25. A head protection system as claimed in any preceding claim, wherein said helmet shell comprises a plurality of layers of ballistic resistant material such as Kevlar, Dyneema, Spectra or a combination thereof.

26. A helmet comprising a shell and mounting means for 30 pivotally mounting a shield member to said shell for

movement between a first position and a second position relative to said shell, and

a locking system for locking said shield member in at least one of said first and second positions, and

5 comprising a lock for preventing movement of said shield member relative to said shell and a manually accessible, compressible member adapted to release said lock on depression thereof, thereby allowing said shield member to move from the respective first or second position.

10 27. A helmet as claimed in claim 26, further including biasing means for biasing said lock into its locking position.

28. A helmet as claimed in claim 26 or 27, wherein said lock comprises a movable member coupled to said 15 compressible member, and one of said shell and a shield member for the helmet includes receiving means for receiving said moveable member.

29. A helmet as claimed in claim 27, further comprising a lock mounting which includes a mounting member 20 mounted to said shell and having an aperture for receiving said compressible member, said compressible member being receivable within an aperture formed in a shield for said helmet.

30. A helmet as claimed in claim 29, wherein said lock 25 mounting further comprises a block adjacent said shell and having a recess for receiving said movable member on depression of said compressible member.

31. A helmet as claimed in claim 30, further including biasing means for urging said moveable member out of said 30 recess.

32. A helmet as claimed in claim 31, wherein said biasing means comprises a spring.

33. A helmet as claimed in any one of claims 30 to 32, comprising a resilient member for coupling said mounting 5 block to said shell and arranged to permit movement of said shield relative to said shell in a direction towards the interior of said shell.

34. A helmet as claimed in any one of claims 30 to 33, wherein said mounting block includes coupling means for 10 coupling said shield to said shell to allow said shell to move between said first position and said second position.

35. A helmet as claimed in claim 26 or 27, further comprising a mounting block mounted to said shell.

36. A helmet as claimed in claim 35, wherein said 15 mounting block has a housing for accommodating said moveable member, an aperture for receiving said moveable member and permitting said moveable member to extend through said aperture beyond a face of said mounting block, said moveable member including means for preventing said moveable member 20 protruding beyond said face more than a predetermined distance.

37. A helmet as claimed in claim 35 or 36, wherein said mounting block includes mounting means for pivotally mounting a shield member therefrom.

25 38. A helmet as claimed in claim 37, wherein said mounting means comprises a boss.

39. A helmet as claimed in claim 37 or 38, further comprising a fastener for releasably retaining a shield member on said mounting means, and a retainer coupled to at

least one of said shell and said mounting block for retaining said fastener thereon.

40. A helmet as claimed in claim 39, wherein said retainer is pivotally mounted to at least one of said block 5 and said shell.

41. A helmet as claimed in any one of claims 35 to 40, further comprising a stop member extending from at least one of said mounting block and said shell for engaging a portion of a shield member and arranged to resist rearward movement 10 of said shield member relative to said helmet shell.

42. A helmet as claimed in claim 41, wherein said stop member is arranged to prevent a force to the front of the shield member being transmitted to said moveable member.

43. A helmet as claimed in claim 42, wherein said stop member is positioned in front of said moveable member. 15

44. A helmet as claimed in any one of claims 35 to 43, further comprising at least one of an audio connector and a microphone connected to said mounting block.

45. A mounting block for a helmet as claimed in any 20 one of claims 35 to 44.

46. A helmet as claimed in any one of claims 26 to 45, wherein said shield comprises a visor.

47. Protective armour comprising a layer of a plastic, transparent material,

25 a plurality of layers of high performance material, said layers being bonded together to form a laminate, and

securing means for securing said laminate to said layer of plastic transparent material.

48. Protective armour as claimed in claim 47, wherein said plastic transparent material comprises polycarbonate.

49. Protective armour as claimed in claim 47 or 48, wherein said securing means comprises urethane between said 5 layer of plastic transparent material and said laminate.

50. Protective armour as claimed in any one of claims 47 to 49, wherein said high performance material comprises a high performance fabric.

51. A visor for a helmet comprising a layer of plastic 10 transparent material, a plurality of layers of high performance material, said layers being bonded together to form a laminate and securing means for securing said laminate to a portion of the surface of said plastic transparent material.

15 52. A visor as claimed in claim 51, wherein said plastic transparent material comprises polycarbonate.

53. A visor as claimed in claim 51 or 52, wherein each of said plurality of layers comprises a composite of high performance material and thermo-plastic or thermo-set resin.

20 54. A visor as claimed in any one of claim 51 to 53, wherein said securing means comprises urethane.

55. A visor as claimed in any one claims 51 to 54, further comprising a further layer of plastic transparent material overlaying said first layer.

25 56. A visor as claimed in claim 55, wherein said further layer comprises one of polycarbonate and acrylic.

57. A process for forming protective armour comprising the steps of providing a layer of plastic transparent material,

forming a laminate comprising a plurality of layers of high performance material and securing said laminate to said layer of plastic transparent material.

58. A process as claimed in claim 57, wherein the step 5 of forming said laminate comprises providing a plurality of layers of high performance composite material and applying at least one of pressure and heat to said plurality of layers to secure said layers together.

59. A process as claimed in claim 57 or 58, wherein 10 the step of securing comprises bonding the plastic transparent material to said laminate using urethane.

60. A process as claimed in claim 59, wherein the step of securing comprises positioning a sheet or layer of urethane between said plastic transparent material and said 15 laminate and applying at least one of heat to said urethane sheet and pressure between said plastic transparent material and said laminate.

61. A process as claimed in any one of claims 57 to 20 60, further comprising applying shape to at least one of the surface of said plastic transparent material and said laminate before securing said layer to said laminate.

62. A helmet comprising a shell, a strap guide mounted on each side of the helmet in a position for supporting a strap for passing under the chin of a wearer, when in use,

25 a strap which passes through and between each strap guide such that the portion of said strap between said strap guides form a chin strap,

30 a support member coupled to the rear of said shell to allow relative movement between said support member and said shell and for engaging a portion of the head or neck of

a wearer, when in use, said strap extending from each strap guide to said support member, and

5 a pull member extending from a position between said support member and said strap guides and which is arranged to cause the length of said strap extending from said support member through said strap guides to shorten when said pull member is pulled.

63. A helmet as claimed in claim 62, further comprising a further pull member extending from said support member and which is arranged to cause the length of said strap extending from said support member through said strap guides to shorten when said further pull member is pulled.

64. A helmet as claimed in claim 62 or 63, further comprising resistance means for resisting extension of the 15 length of said strap extending from said support member through said strap guides on releasing the or each pull member.

65. A helmet as claimed in claim 64, further comprising release means for disabling said resistance 20 means.

66. A helmet as claimed in claim 65, wherein said release means includes a pull tab arranged to disable to said resistance means when said pull tab is pulled.

67. A helmet as claimed in any one of claims 62 to 66, 25 further comprising a connector for releasably connecting one portion of said strap to a second portion of said strap and positioned within the length of said strap which extends from said support member through said strap guides.

68. A helmet as claimed in claim 67, wherein said 30 connector is positioned between said strap guides.

69. A retention system for a helmet comprising first and second strap guides for mounting on each side of the helmet in a position for supporting a strap for passing under the chin of a wearer, when in use, a strap which passes through and between each strap guide, the portion of said strap between said strap guides forming a chin strap, a support member for movably coupling to the rear of said helmet for engaging a portion of the head or neck of a wearer when in use, said strap extending from each strap guide to said support member, and pull members extending from said support member and which are arranged to cause the length of said strap extending from said support member through said strap guides to shorten when said pull members are pulled.

10 15 70. A retention system as claimed in claim 69, further comprising resistance means for resisting extension of said length on releasing said pull member.

20 71. A retention system as claimed in claim 69, further comprising release means for disabling said resistance means.

72. A retention system as claimed in any one of claims 69 to 71, wherein the or each pull member comprises an extension of said strap.

25 73. A retention system as claimed in any one of claims 69 to 72, wherein the or each pull member comprises an extension of said strap.

30 74. A helmet comprising a shell, an electrically powered system for assisting a wearer, and a power controller for controlling the power delivered to said system, wherein said power controller is releasably mounted to said shell.

75. A helmet as claimed in claim 74, wherein said power controller comprises monitoring means for monitoring a condition of said controller.

76. A helmet as claimed in claim 75, further comprising an indicator for indicating said condition.

77. A helmet as claimed in claim 76, wherein said indicator comprises any one or more or an audio indicator, a visual indicator and a tactile indicator.

78. A helmet as claimed in any one of claims 74 to 77, comprising a housing unit for housing said power controller, said housing unit being releasably mounted to said shell and said housing unit further comprising electrically powered means for providing ventilation air to the interior of said helmet.

79. A helmet as claimed in claim 78, further comprising a visor, said visor having a moisture reducing treatment on the surface thereof facing the interior of the shell.

80. A helmet comprising a shell, a visor having a moisture reducing means treatment on the surface thereof facing the interior of the shell, and electrically powered means for providing ventilation air to the interior of said helmet, said electrically powered means being mounted to said helmet.

81. A helmet as claimed in claim 80, wherein said electrically powered means is mounted adjacent said helmet.

82. A helmet as claimed in claim 80 or 81, comprising a housing unit housing said electrically powered means and which is releasably mounted on said shell.

83. A helmet as claimed in claim 82, wherein said housing unit is mounted on the exterior of said shell.

84. A helmet as claimed in any one of claims 74 to 83, comprising a visor, said visor comprising a layer of 5 transparent plastic material and a laminate secured to said layer, said laminate comprising a plurality of layers of high performance material.

85. A helmet as claimed in claim 84, wherein said laminate is secured to said layer of transparent plastic 10 material by urethane.

86. A helmet as claimed in claim 85, wherein each layer of said laminate comprises a composite of high performance material and thermo-plastic resin.

87. A control unit for controlling an electrically 15 powered system for a helmet, the control unit having securing means for releasably securing the control unit to a helmet.

88. A control unit as claimed in claim 87, further comprising a monitor for monitoring a condition of said 20 control unit.

89. A control unit as claimed in claim 88, further comprising an indicator for indicating said condition.

90. A control unit as claimed in claim 89, wherein 25 said indicator comprises any one or more of an audio indicator, a visual indicator and a tactile indicator.

91. A helmet comprising a shell, a shield member and coupling means for coupling the shield member to the shell and permitting movement of said shield member relative to said shell, and shock absorption means coupled to said 30 coupling means and arranged to permit movement of said

shield member relative to said shell independently of said coupling means.

92. A helmet as claimed in claim 91, wherein said coupling means comprises pivot means for pivotally coupling 5 said shield member to said shell.

93. A helmet as claimed in claim 92, wherein said pivot means comprises a pin or bolt coupled to said shield member.

94. A helmet as claimed in any of claims 91 to 93, 10 wherein said shock absorption means comprises a member formed of a resilient material.

95. A helmet as claimed in claim 94, wherein said coupling means comprises pivot means for pivotally coupling said shield member to said shell, and wherein said resilient 15 member defines an aperture for receiving said pivot means.

96. A helmet as claimed in claim 95, further comprising a mounting block secured to said shell and having a receptacle for receiving said resilient member.

97. A helmet as claimed in claim 91, wherein said 20 coupling means is arranged to permit slidable movement of said shield member relative to said shell.

98. A helmet as claimed in any of claims 91 to 97, wherein said shield member comprises a visor.

99. A helmet comprising a shell and a shield member 25 coupled to said shell for movement between a first position and a second position relative to said shell, and

a locking system for locking said shield member in at least one of said first and second positions and comprising a rotary cam mounted on said shell, an aperture

formed in said shield member and an opening in the side of said aperture for receiving said cam into said aperture, said aperture permitting rotation of said cam when located in said aperture to a position which prevents movement of 5 said cam from said aperture through said opening.

100. A protective system comprising a protective helmet, at least one electrically operated device mounted to said helmet, a controller for controlling said device from a location remote from said helmet, means for transmitting 10 control signals from said controller to said device, wherein said controller includes fastening means for fastening the controller to a part of a wearer's body so that, in use, the second controller is visible to the wearer.

101. A protective system as claimed in claim 100, 15 wherein said controller comprises visual indicator means whose appearance changes in response to a condition associated with said helmet or said controller.

102. A protective system comprising a helmet, at least one electrically operated device mounted to said helmet, a 20 controller for controlling said device from a location remote from said helmet, means for transmitting control signals from said controller to said device, and wherein said controller includes visual indicating means responsive to a condition associated with at least one of said helmet 25 and said controller.

103. A protective system comprising a helmet, at least one electrically operated device mounted to said helmet, a monitor for monitoring said device from a location remote from said helmet and means for transmitting signals from 30 said device to said monitor.

104. A protective system comprising a helmet, at least one electrically operated device mounted to said helmet,

means for at least one of controlling said device and monitoring said device from a location remote from said helmet, means for transmitting signals from at least one of said controller and said device to the other of said controller and said device, and a retainer mounted on the clothing of a wearer for retaining said controller.

105. A protective system as claimed in claim 104, wherein said retainer comprises a pocket having an aperture to allow at least one of a display and control panel to be viewed by a wearer.

106. A protective system as claimed in any of claims 100 to 105, further comprising a second controller mounted to said helmet for controlling said device.

107. A protective system as claimed in claim 106, wherein said first and second controllers are arranged to control at least one function of the device which is the same function.

108. A protective system as claimed in claim 107, wherein said device is arranged to control said function in response to a control command from either of said first and second controllers.

109. A protective system as claimed in any of claims 100 to 108, wherein said electrical device comprises one of: a fluid impeller, an amplifier, a microphone, a speaker, a light source, and a heater.

110. A protective system as claimed in any of claims 100 to 109, wherein said fastening means is adapted for fastening said controller to a limb of a wearer, for example, a hand, wrist, arm or leg.

111. A protective system as claimed in any of claims 100 to 110, wherein said controller includes a key for controlling one of a fluid impeller, an amplifier, a microphone, a speaker, a light source, and a heater.

5 112. A protective system as claimed in any of claims 100 to 111, wherein said controller or monitor comprises power input receiving means for receiving power for driving said controller from a source of electrical energy remote from said controller, for example an  
10 electrical energy source mounted to said helmet.

113. A protective system comprising a helmet, at least one electrically device mounted to said helmet and a source of electrical energy mounted to said helmet and arranged to drive said electrically operated device.

15 114. A protective system as claimed in claim 113, wherein said electrical energy source is mounted on the rear of said helmet.

115. A protective helmet having a side portion which covers the ear of a user, and a microphone positioned on  
20 said side portion.

116. A helmet as claimed in claim 115, further comprising a further side portion opposite said first side portion for covering the ear of a user and a further microphone positioned adjacent said further side portion.

25 117. A head protector comprising a helmet shell having a head cavity therein, a liner for lining said head cavity, wherein at least one of the liner and the shell includes at least one retainer for slidably receiving a packing member for adjusting the size of the head cavity.

118. A head protector as claimed in claim 117, wherein the liner has an exterior face towards the head cavity and an opposed interior face towards the helmet shell, and said at least one retainer is disposed on the interior face of  
5 the liner.

119. A head protector as claimed in claim 117 or 118, having opposed sides, a front and a back, and at least one retainer on one side of the head protector and at least one retainer on the other side of the head protector.

10 120. A head protector as claimed in any of claims 117 to 119, wherein said head protector has opposed sides, a front and a back, and at least one retainer positioned at the front of the head protector.

15 121. A head protector as claimed in any of claims 117 to 120, having opposed sides, a front and a back, and at least one retainer positioned at the back thereof.

122. A head protector as claimed in any of claims 117 to 121, wherein the exterior face of said liner includes fluted portions in which the flutes extend between upper and  
20 lower regions of the liner.

123. A head protector as claimed in claim 122, wherein said flutes are formed by compressing regions of said liner.

124. A head protector as claimed in claim 123, wherein said flutes are formed by stitching.

25 125. A head protector as claimed in claim 124, wherein said stitching provides a means of fastening the or each retainer to said liner.

126. A head protector as claimed in any of claims 117 to 125, further comprising fastening means for securing the  
30 liner to the helmet shell.

127. A head protector as claimed in claim 126, wherein said fastening means is positioned adjacent a peripheral edge of said helmet shell.

128. A head protector as claimed in claim 126 or 127,  
5 wherein said fastening means comprises a zipper.

129. A head protector as claimed in any of claims 117 to 128, further comprising a form sustaining insert insertable in said shell, and wherein said retaining means includes a layer of material over the interior face of said 10 insert and said fastening means is secured thereto.

130. A head protector as claimed in any of claims 117 to 125, further comprising an inner peripheral surface adjacent the lower edge of said helmet, and including at least one fastening means, and said liner comprises at least 15 one fastening member for fastening to said fastening means.

131. A head protector comprising a helmet shell and a shield, and coupling means for slidably engaging and disengaging the shield to and from the helmet shell.

132. A head protector as claimed in claim 131, further 20 including means for preventing slidable disconnection of said shield from said helmet shell.

133. A head protector as claimed in claim 132, wherein said retaining means engages to prevent said slidable disconnection in response to movement of said shield 25 relative to said helmet shell from a first position to the second position.

134. A head protector as claimed in any of claims 131 to 133, wherein said coupling means includes means for rotatably coupling said shield to said helmet shell.

135. A head protector as claimed in any of claims 131 to 134, wherein said shield comprises a visor.

136. A head protector as claimed in any of claims 131 to 135, wherein said coupling means includes means defining 5 a slot having an open end, said means being associated with one of said helmet and said shield, and means receivable through the said open end and associated with the other of said helmet and said shield for mounting the shield on the helmet.

10 137. A head protector as claimed in claim 136, further comprising retaining means for retaining said receivable means in said slot.

138. A head protector as claimed in claim 137, wherein 15 said receivable means comprises a member which allows relative rotation between said slot and said member when said member is inserted in said slot, and said retaining means is arranged to prevent withdrawal of said member from said slot on rotation of said slot relative to said member from a first position, in which said withdrawal is possible, 20 to a second position in which said withdrawal is prevented.

139. A head protector as claimed in any of claims 131 to 138, wherein said retaining means comprises a further slot associated with one of said shield and said helmet shell, and a further member associated with the other of 25 said shield and said helmet shell which is arranged to travel in said slot when said shield is mounted on said helmet shell and the shield is rotated from said first position.

140. A head protector as claimed in claim 139, further 30 comprising a third slot associated with one of said shield and said helmet shell and a third member which is arranged

to travel in said third slot when said shield is rotated from said first position.

141. A head protector as claimed in claim 140, wherein said further and third members are disposed on opposite 5 sides of said first member.

142. A head protector as claimed in any of claims 131 to 141, wherein said coupling includes impact absorption means between the shield and the helmet shell.

143. A head protector as claimed in claim 142, wherein 10 said first member includes said impact absorption means.

144. A head protector comprising a helmet and a retainer for retaining the helmet on the head of a wearer wherein the retainer includes means extending from the helmet for supporting a connector either side of the helmet, 15 each connector being adapted to releasably and interchangeably connect one of a chin cup and an under-the-jaw strap thereto.

145. A protective system comprising a helmet and a plurality of visors which can be interchangeably connected 20 to the helmet and coupling means for coupling each visor to the helmet.

146. A protective system as claimed in claim 145, wherein said plurality of visors includes an EOD visor and at least one of a search visor having a larger transparent 25 area than the EOD visor and a visor adapted to accommodate a respirator or gas mask.

147. A protective system as claimed in claim 145 or 146, wherein the coupling means is adapted to permit each visor to be removably connected to the helmet without 30 removing the helmet from the head of the wearer.

148. A protective system s claimed in any one of claims 145 to 147, wherein each visor is slidably connectable to the helmet.

149. A helmet having a retainer including a nape support, the nape support being connected to the helmet by first and second straps which extend at an angle and transversely from a common region of the nape.

150. A helmet having a retainer including a nape support and an adjustable strap for tightening the retainer about the head of a wearer, wherein the adjustable strap is connected to extend downwardly, and optionally sideways from the nape support.

151. A chin cup for a retention system, comprising a chin pad, having an upper portion and a lower portion, and a first strap positioned adjacent said upper portion and a second strap positioned adjacent said lower portion.